

In the Claims:

1. (Original) A method for making a remote copy between a first storage subsystem and a second storage subsystem which are connected to each other via a path, the first storage system connected to a first host, the method comprising the steps of:

providing a first logical volume to the first storage subsystem and a second logical volume to the second storage subsystem, the second logical volume being a copied logical volume of the first logical volume, the first logical volume and the second logical volume being in sync state,

making a third logical volume in the first storage subsystem, the third logical volume being a copied logical volume of the first logical volume, the first logical volume and the third logical volume being in sync state,

making a fourth logical volume in the second storage subsystem, the fourth logical volume being a copied logical volume of the second logical volume, the second logical volume and the fourth logical volume being in sync state,

breaking the sync state between the first logical volume and the third logical volume and between the second logical volume and the fourth logical volume based on a command, and

synchronizing the fourth logical volume with the third logical volume.

2. (Original) The method of claim 1, further comprising:

providing a first auxiliary host at the first storage subsystem, the first auxiliary host having permissions to access the third logical volume;

providing a second auxiliary host at the second storage subsystem, the second auxiliary host having permissions to access the fourth logical volume; and

executing applications using the first auxiliary host, the second auxiliary host, the third logical volume and the fourth logical volume.

3. (Original) The method of claim 2, wherein

executing applications comprises performing data recovery testing, and

making a third logical volume in the first storage subsystem comprises storing a test copy of data used by the first host on the third logical volume, and

making a fourth logical volume in the second storage subsystem comprises forming a mirror image of data in the third logical volume on the fourth volume.

4. (Original) The method of claim 3, wherein
data recovery testing comprises:
simulating a disaster at the first auxiliary host; and
testing backup of information from the third logical volume to the fourth logical volume, and recovery there from.

5. (Original) The method of claim 2, wherein
executing applications comprises performing data mining, and
making a third logical volume in the first storage subsystem comprises establishing on the third volume a data warehouse having a copy of on line transactions processing (OLTP) data used by the first host, and
making a fourth logical volume in the second storage subsystem comprises forming a mirror image of data in the third logical volume on the fourth volume.

6. (Original) The method of claim 5, wherein
data mining comprises:
establishing a data warehouse having a copy of on line transaction processing data at the first auxiliary host; and
performing data analyses on the data warehouse information, and
performing backups and/or recovery of the data warehouse information of the third logical volume to the fourth logical volume.

7. (Original) The method of claim 1, further comprising:
determining if the sync state between the first logical volume and the second logical volume is an asynchronous mirror, and if so:

inhibiting sending of further write data from the first storage subsystem to the second storage subsystem;

recording incoming write data at the first storage subsystem; and

re-synchronizing the first logical volume and the second logical volume after breaking the sync state between the second logical volume and the fourth logical volume.

8. (Original) The method of claim 1, wherein synchronizing the fourth logical volume with the third logical volume comprises: issuing a command to form a mirror with a no copy option; and creating a new copy management storage area for the mirror.

9. (Currently amended) A computer readable storage medium having stored thereon an atomic split command, comprising:

a primary volume id (PVOL ID) indicating a primary volume (PVOL), the PVOL having a local mirror connection with a primary mirror volume; and

a secondary volume id (SVOL ID) indicating a secondary volume (SVOL), the SVOL being having a local mirror connection with the PVOL and with a secondary mirror volume; the atomic split command instructing the PVOL to remove the local mirror connection with the primary mirror volume and instructing the SVOL to remove the local mirror connection with the secondary mirror volume.

10. (Original) The computer readable storage medium of claim 9, wherein the primary volume id comprises a serial number of a storage system; and a volume serial number within the storage system.

11. (Original) An apparatus, comprising:

a first means for storing data;

a second means for storing data, being remotable from and a copy of content of the first means for storing data, and being in a sync state with the first means for storing data;

a third means for storing data, co-located with and a copy of content of the first means for storing data, and being in a sync state with the first means for storing data;

a fourth means for storing data, co-located with and a copy of content of the second means for storing data, and being in a sync state with the second means for storing data;

a means for breaking the sync state between the first means for storing data and the third means for storing data and between the second means for storing data and the fourth means for storing data; and

a means for synchronizing the fourth means for storing data with the third means for storing data after breaking the sync state.

12. (Original) The apparatus of claim 11,
further comprising:

a means for creating an atomic split command, the command comprising:

an identity of a first means for storing data to serve as a primary volume; and

an identity of a second means for storing data to serve as a secondary volume.

13. (Original) The apparatus of claim 11,
further comprising:

a means for creating an atomic split command, the command comprising:

a first remote mirror, ORA_R1, comprised of the first means for storing data and the second means for storing data;

a second remote mirror, ORA_R2, comprised of the third means for storing data and the fourth means for storing data;

a first local mirror, ORA_L, comprised of the first means for storing data and the third means for storing data; and

a second local mirror, ORA_RL, comprised of the second means for storing data and the fourth means for storing data.

14. (Original) A method, comprising:

establishing a first remote mirror between a first logical unit in a first storage system and a second logical unit in a second storage system,

establishing a first local mirror between the first logical unit and a third logical unit in the first storage system;

establishing a second local mirror between the second logical unit and a fourth logical unit in the second storage system;

splitting the first local mirror and the second local mirror; and

establishing a second remote mirror between the third logical unit and the fourth logical unit.

15. (Original) The method of claim 14, wherein
using the logical volumes of the first remote mirror for production processing; and
using the logical volumes of the second remote mirror for testing.

16. (Original) The method of claim 14, wherein
using the logical volumes of the first remote mirror for on line transaction processing; and
using the logical volumes of the second remote mirror for data mining.

17. (Original) The method of claim 14, wherein
establishing a second remote mirror between the third logical unit and the fourth logical unit comprises:
issuing a create mirror command with a no copy option; and
creating a new copy management information store for managing mirroring between the third logical unit and the fourth logical unit.

18. (Original) The method of claim 14, wherein
splitting further comprises:
determining whether the first remote mirror is asynchronous, and if so:
copying all pending information to the second storage system.

19. (Original) A plurality of remote copy mirrors formed according to the method of claim 1.

20. (Original) A plurality of remote copy mirrors formed according to the method of claim 14

21. (Original) A computer program product, comprising:
code for establishing a first remote mirror between a first logical unit in a first storage system and a second logical unit in a second storage system,
code for establishing a first local mirror between the first logical unit and a third logical unit in the first storage system;
code for establishing a second local mirror between the second logical unit and a fourth logical unit in the second storage system;
code for splitting the first local mirror and the second local mirror;
code for establishing a second remote mirror between the third logical unit and the fourth logical unit; and
a computer readable storage medium for holding the codes.